

# Case Reports

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## Diastrophic Dysplasia : A Case Report

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### Introduction:

Diastrophic is a Greek word meaning twisted or tortuous. The term was first used in 1960 for a dysplastic condition of bones.<sup>1</sup> Skeletal dysplasias are a heterogeneous group of conditions associated with abnormalities of skeleton, including its shape, size and density, manifest in limbs, chest, or skull.<sup>2</sup> Here, disorders of cartilage and bone are generalized.<sup>3</sup> The name 'diastrophic dysplasia' (DTD) was chosen to indicate "twisted" appearance of spine and limbs in severely affected individual. This is an autosomal recessive hereditary disorder with a gene in chromosome 5q which is known as diastrophic dysplasia sulfate transporter (*DTDST*) gene.<sup>4</sup> The gene encodes a transmembrane protein that transports sulfate into chondrocytes to maintain adequate sulfation of proteoglycans. Diastrophic dysplasia results from mutations in this gene leading to inherited chondrodysplasias hence impairment of skeletal development.<sup>5</sup>

The diagnosis is usually made at birth from disproportionate, short limbed dwarfism.<sup>1</sup> Deformity in hands and feet with hitchhiker thumbs, talipes equinovarus are common. Cystic masses on ear lobes appear in 85% cases<sup>6</sup>. Cleft palate and limitation in movements in different joints are common.<sup>4,6</sup> Thoracolumbar kyphoscoliosis is seen in majority of cases<sup>6</sup>.

Diastrophic dysplasia is observed in most white populations, but is notably more prevalent among Finns. In Finland, 1-2% of the population carries a mutation in the DTD gene (*DTDST*), with an incidence of 1 in 33,000 births. The incidence is 1:500,000 births in the United States. In 1990, there were 160 Finns

patients with skeletal dysplasia, while there were fewer than 300 patients in rest of the world.<sup>7,8</sup> Clinical presentation of this disorder may confuse with other form of dwarfism with bone disorder. Frequency of occurrence of this condition is not known in our country. Even it is difficult to say about any case report of such disorder from here. The case is presented here with a view to orient our clinicians specially pediatricians and neonatologist regarding such rare disorder so that the condition may be diagnosed early with timely management.

### Case Report

One month old female infant, third issue of a non-consanguineous parent from Hathazari, Chittagong was admitted in Pediatric department of Chittagong Medical College Hospital with the complaints of swelling of both external ears for 7 days. The mother was under regular antenatal checkup. Her antenatal period was uneventful. She delivered the baby at term through birth canal. The baby cried 2 minutes after birth following resuscitation. Breastfeeding was established on first postnatal day. According to mother's statement the baby was alright up to 3<sup>rd</sup> weeks of postnatal age except some deformity on her feet. Thereafter, the mother observed a swelling on both ears of her baby (Fig:-1). The swelling was initially small but increased in size involving almost whole pinnae over couple of days. On query, she complained occasional nasal regurgitation of breast milk of her baby during feeding since birth. History of respiratory difficulty, fever, reluctance in feeding or bluish discoloration of infant was absent. The other two sibs of infant are in good health. On examination, weight of infant was 3000g, length was 43 cm, upper segment to lower segment ratio was 1.8 and occipito frontal circumference was 35.5 cm. Anterior fontanel size was 2.5 x 2.5 cm and posterior fontanel was closed. There was a bilateral spherical soft cystic swelling occupying maximum space of each auricle. Overlying skin on the cysts was normal. There was a small cleft in soft palate but hard palate and lips were

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normal. Her arms and forearms were short with ulnar deviation. Hitchhiker thumb was absent. Lower limbs were also short with bilateral talipes equinovarus (club foot)(Fig:-1). Flexion deformity was observed at knee and elbow joints. Hip joints, back and spine appeared normal. Other systems including heart and lungs revealed normal. Her routine hematological



**Fig.-1:** Infant showing swelling on ear with club feet

investigations were normal. There was hypoplasia of C<sub>5</sub> to C<sub>7</sub> vertebra and a gap in lamina of C<sub>5</sub> and C<sub>6</sub> level was seen (Fig:-2). Dorsolumbar spine was normal. X-ray of both hands revealed radial curvature with metaphyseal widening of radius (Fig:-3). The baby was managed that time through routine care along with counseling of mother.



**Fig.-2:** Hypoplastic c<sub>5</sub> to c<sub>7</sub> cervical spines:



**Fig.-3:** Radial curvature with metaphyseal widening of radius

**Discussion:**

Skeletal dysplasias are a heterogeneous group of dysplasias that include more than 200 recognized conditions. They are disorders of growth and remodeling of bone and cartilage. Most disorders result in short stature. Dwarfism may be considered as short-limb or short-trunk types, depending on part of the body that is severely affected. Diastrophic dysplasia is considered as short-limb dwarfing condition.<sup>9</sup> Impairment of physeal, epiphyseal, and articular cartilage throughout the body is responsible for characteristic findings. Respiratory difficulties, neurogenic problems, family history, and history of any prior skeletal surgery should be investigated. Diagnosis can be made with observation of pathognomic features at birth or within first few months of life, when the cystic swelling of ears becomes apparent.<sup>10</sup> The present case is diagnosed by the end of 4<sup>th</sup> week of life with the appearance of swelling on both ears. In DTD, upper-to-lower segment ratio is usually more than 1.6 at birth. Typical facial features are present in most patients.<sup>11</sup> Prominent cheek and circumferential fullness, narrow nasal bridge without flattening or depression are important features. Approximately 50% of patients have a cleft palate, either complete or partial. Other abnormalities, such as a high arched palate, bifid uvula, or submucous clefts, are common. The cleft palate may contribute

to aspiration pneumonia. The cartilage of larynx and trachea is abnormally soft, and this may contribute to narrowing of respiratory passages. Though pinnae are unaffected at birth, develop acute swelling, usually bilateral, at 3-6 weeks of age.<sup>12</sup> The swelling is cystic and can be associated with inflammation and pain.<sup>13</sup> In case of present case, the swellings were observed within this range of time. In DTD, one half to one third of patients develop cervical kyphosis which may be present even in infancy.<sup>12</sup> External signs of cervical abnormalities are generally absent. However, 80% of patients present with some degree of spinal curvature. In present case, like other cases scoliosis was absent at birth. It develops within first year of life. Lumbar lordosis is usually significant. The hips maintain a persistent flexion contracture. Patients may present with hip subluxation. Valgus may develop at knee joint, along with subluxation of patella and flexion contracture. The hands are short, broad, and there is ulnar deviation due to shortening of ulna. The fingers appear widely spaced.<sup>14</sup> The abducted, hypermobile, hitchhiker thumb, a consistent feature of DTD in about 95% of cases<sup>14</sup> was absent in present case.

In DTD, there are foot deformities along with bony malformations, contracture, and malalignment. Deformities range from equinovarus to pure equinus or valgus.<sup>14</sup> In the present case, cervical spine has abnormalities but scoliosis is absent at birth like other cases of DTD. In the present case, like other case long bones are short and thick and appear relatively massive. Mild metaphyseal broadening and flaring are seen in very early period of this case. In DTD, both ulna and fibula are shortened, contributing to valgus of knees and radial head subluxation. Excessive valgus is present in knee joint, with a mean tibiofemoral angle of 14°. The patellofemoral joint may be abnormal and patella is in a lateral position with bony fragmentation. Like other cases equinus deformity in feet is observed in this case. Complications include spinal cord injury; motor delay; degenerative joint disease and progressive scoliosis is common. Average adult heights are 88-128 cm for males and 105-123 cm for females. Lifespan and intelligence is normal in this condition.<sup>15</sup> The disorder may be associated with neurologic, auditory, visual, pulmonary, cardiac, renal, and psychological complications.<sup>16</sup>

Differentiation of DTD from similar forms of dwarfism, especially achondroplasia, is important because of

greater morbidity, greater difficulty in case management and poorer reproductive prognosis for parents in cases of DTD. Achondroplasia is a form of dwarfism produced by changes in growth due to deficiency of endochondral ossification, caused by mutation in the gene located at 4p16.3. A patient with achondroplasia, born from normal parents, is usually the result from a new mutation. The risk of recurrence is very low, while in DTD the risk is 25%. Errors in genetic counseling have been committed because of confusion between these two conditions. Recently, with the advent of prenatal molecular diagnosis, there has been a reduction in diagnostic errors.<sup>7</sup> Antenatal diagnosis can be offered for the next pregnancy through ultrasound screening of fetus for abnormal thumb and short limbs.<sup>15</sup> In this report neither the parents has consanguinity nor there is history of DTD in their families. This indicates that the case may be a representative from 5% case of DTD who are due to sporadic new mutation.<sup>16</sup> The optimal management of this disorder can be accomplished by a center with multidisciplinary approach. It includes internists or pediatricians and a group of experienced orthopedists, rheumatologists, otolaryngologists, neurologists, neurosurgeons, ophthalmologists, and obstetrician-gynecologists who are committed to the care of such patient.<sup>3</sup>

### Conclusion:

Skeletal dysplasias represent a heterogeneous group of relatively rare disorders. Affected individuals have significant complications throughout their lives. Accurate diagnosis is often challenging in practice. Radiologist plays an important role in this process, but pathologists and molecular biologists can provide important information for correct diagnosis. Prenatal diagnosis of DTD during second trimester of pregnancy has implications for earlier clinical decision and genetic counseling. Antenatal diagnosis can be offered through ultrasound screening for abnormal thumb and short limbs. Identification of DTDST gene makes molecular diagnosis reliable for most families with a positive history, and even for families without other family cases. As affected neonate may have pulmonary and neurological problems in cervical region, special emphasis is to be given in this aspect. Nutritional counseling is important to prevent obesity following difficulty in ambulation along with other multidisciplinary approach. The importance of the present report is because of scarcity of reporting such

case in this area, absence of an important consistent hand finding hitchhiker thumb and absence of consanguinity or any other such case in this family.

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